AEROSPACE MATERIAL SPECIFICATION

AMS4162™	REV. G

Issued 1968-05
Reaffirmed 2008-05
Revised 2025-04

Superseding AMS4162F

Aluminum Alloy, Extrusions, 6.3Cu - 0.30Mn - 0.18Zr - 0.10V - 0.06Ti (2219-T8511), Solution Treated, Stress Relief Stretched, Straightened, and Precipitation Heat Treated (Composition similar to A92219)

RATIONALE

AMS4162G results from a Five-Year Review and update of this specification with changes to update standard language related to unauthorized exceptions (see 3.3.1.2, 4.4.1, and 8.5), relocate Definitions (see 2.4), and update Applicable Documents (see Section 2) and Ordering Information (see 8.6).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, wire, profiles, and tubing up through 2.999 inches (76.2 mm) in diameter, least thickness, or wall thickness and 25 square inches (161 cm^2) or less in cross-sectional area (see 8.6).

1.2 Application

These extrusions have been used typically for structural parts requiring high strength up to 500 °F (260 °C), but usage is not limited to such applications. May be welded in the specified condition but properties are improved by reheat treatment after welding. Reheat treatment after welding, however, may reduce resistance to stress-corrosion cracking.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS4162G/

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2355 Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings

AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

AS7766 Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B594 Ultrasonic Inspection of Aluminum-Alloy Wrought Products

ASTM B660 Packaging/Packing of Aluminum and Magnesium Products

ASTM B666/B666M Identification Marking of Aluminum and Magnesium Products

ASTM E10 Standard Test Method for Brinell Hardness of Metallic Materials

ASTM G47 Determining Susceptibility to Stress Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products

2.3 ANSI Accredited Publications

Copies of these documents are available online at https://webstore.ansi.org/.

ANSI H35.1/H35.1M Standard Alloy and Temper Designation System for Aluminum

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products

ANSI H35.2M Dimensional Tolerances for Aluminum Mill Products (Metric)

2.4 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2355.

Table 1 - Composition

Element	Min	Max
Silicon	--	0.20
Iron	--	0.30
Copper	5.8	6.8
Manganese	0.20	0.40
Magnesium	--	0.02
Zinc	--	0.10
Titanium	0.02	0.10
Vanadium	0.05	0.15
Zirconium	0.10	0.25
Other Elements, each	--	0.05
Other Elements, total	--	0.15

3.2 Condition

Solution heat treated, stress relieved by stretching to produce a nominal permanent set of 1.5%, but not less than 1% nor more than 3%, and precipitation heat treated to the T8511 temper (refer to ANSI H35.1/H35.1M). Heat treatments shall be performed in accordance with AMS2772.

3.2.1 Extrusions may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.5.

3.2.2 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within specified dimensional tolerances.

3.3 Properties

Extrusions shall conform to the following requirements, determined on the mill-produced size in accordance with AMS2355:

3.3.1 Tensile Properties

Shall be as shown in Table 2 for extrusions up through 2.999 inches (76.20 mm) in nominal diameter or least thickness (bars, rods, wire, profiles) or nominal wall thickness (tubing) and 25 square inches (161 cm^2) and under in cross-sectional area.

Table 2A - Minimum tensile properties, inch/pound units

Nominal Thickness Inches	Specimen Orientation	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up thru 2.999	Longitudinal	58.0	42.0	6
	Long-Trans.	56.0	39.0	4

Table 2B - Minimum tensile properties, SI units

Nominal Thickness Millimeters	Specimen Orientation	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up thru 76.20	Longitudinal	400	290	6
	Long-Trans.	386	269	4

3.3.1.1 Long-transverse tensile requirements apply only to extrusions from which a test specimen not less than 2.500 inches (63.50 mm) in length can be taken.

3.3.1.2 Mechanical properties for product outside the range covered by 1.1 shall be agreed upon between the purchaser and producer and reported per 4.4.1 (see 8.6).

3.3.2 Stress-Corrosion Resistance

Specimens, cut from extrusions 0.750 inch (19.05 mm) and over in nominal diameter or least thickness, shall exhibit no evidence of stress-corrosion cracking when stressed in the short-transverse (perpendicular to grain flow) direction to 30.0 ksi (207 MPa) when tested in accordance with ASTM G47.

3.4 Quality

Extrusions, as received by the purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the extrusions.

3.4.1 When specified, extrusions shall be subjected to ultrasonic inspection in accordance with ASTM B594. Extrusions 0.500 inch (12.70 mm) and over in nominal thickness shall meet ultrasonic Class B (see 8.6).

3.5 Tolerances

Shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M, except that surface roughness tolerances shall be double those specified therein.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of extrusions shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the extrusions conform to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (see 3.1), longitudinal tensile properties (see 3.3.1), ultrasonic inspection when specified (see 3.4.1), and tolerances (see 3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests

Long-transverse tensile properties (see 3.3.1.1) and stress-corrosion resistance (see 3.3.2) are periodic tests and shall be performed at a frequency selected by the producer unless frequency of testing is specified by the purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

The producer of extrusions shall furnish with each shipment a report stating that the extrusions conform to the chemical composition, ultrasonic inspection when specified, and tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements. This report shall include the purchase order number, inspection lot number, AMS4162G, size or section identification number, and quantity. The report shall also identify the producer, the product form, and the size of the mill product.